LL50SE-DA-100-1400-DS

Helvar

50 W **SELV Dimmable DALI-2** LED driver

Product code: 5763

50 W 220 – 240 V 0 / 50 – 60 Hz

- DALI-2 certified LED driver, 1-100 % dimming range
- SELV output protection for safety and flexibility in luminaires
- Amplitude dimming for the highest quality light output, complying with IEEE 1789 recommendation
- NFC technology for wireless programming
- DIP switch for simple output current adjustment
- Suitable for use in emergency lighting applications
- Ideal solution for Class I and Class II
- Helvar Driver Configurator support

SWITCH-CONTROL 2 NFC SELV DALI 2

Functional Description

- Adjustable constant current output: 100 mA to 1400 mA, 350 mA as default
- Current setting adjustable via DIP switch (default), or then programmable via NFC / DALI
- The output current can be set in a fixed way with with Helvar Driver Configurator (HDC) and DIP switch position ignored
- Innovative Smart Switch technology: the DIP switch current values for different positions can also be programmed by the user in HDC to differ from the factory defaults and driver will follow this in output current setting
- Amplitude dimming technology for the highest quality light in every application
- Suitable for flicker-free camera recording applications
- Latest technology Switch-Control 2 functionality for easy-to-use intensity control
- Full load recognition with automatic recovery, open and short circuit protection
- Constant Light Output (CLO), adjustable up to 100 000 h (default disabled)

Mains Characteristics

Nominal rated voltage range	220 V – 240 V, 0 / 50 – 60 Hz
AC voltage range	198 VAC – 264 VAC Withstands max. 320 VAC (max. 1 hour)
DC voltage range	176 VDC – 280 VDC
DC starting voltage	> 190 VDC
Mains current at full load	0.25 – 0.28 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.5 W
THD at full power	< 10 %
Leakage current to earth	< 0.4 mA
Tested surge protection	1 kV L-N, 2 kV L-GND (IEC 61000-4-5)
Tested fast transient protection	2 kV (IEC 61000-4-4)

Insulation between circuits & driver case

Mains circuit - SELV circuit	Double/reinforced insulation
DALI circuit - SELV circuit	Double/reinforced insulation
Mains circuit - DALI circuit	Basic insulation
Output - Driver case	Basic insulation
Mains and DALI circuit - Driver case	Double/reinforced insulation
Mains input - Ground input	Double/reinforced insulation

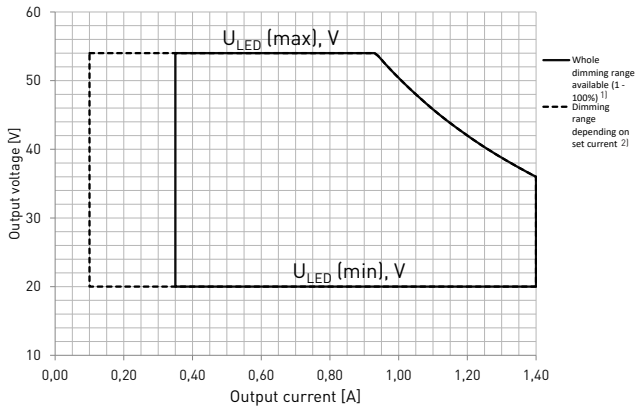
Load Output (SELV <60 V)

Output current (I_{out})	100 mA – 1400 mA
Accuracy	± 5 %
Ripple	< 1 % [1] at ⩽ 120 Hz
PstLM	< 0.03 [2]
SVM	< 0.01 [2]
U_{out} (max) (abnormal)	60 V
EOF_X (EL use)	> 0.98 x output current with AC supply

1) Low frequency, LED load: Cree XP-G LEDs 2) at full power, load: Cree XP-G LEDs

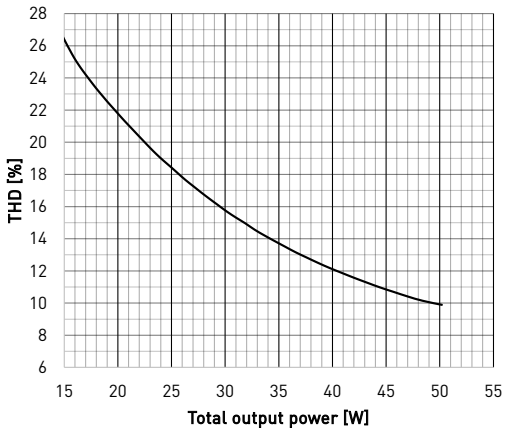
I_{LED}	100 mA	350 mA	1400 mA
P_{Rated}	2...5.4 W	7.7...18.9 W	28...50.4 W
U_{LED}	20 - 54 V	20 - 54 V	20 - 36 V
PF (λ) at full load	0.75	0.92	0.98
Efficiency (η) at full load	69 %	84 %	87 %

Operating window & driver performance

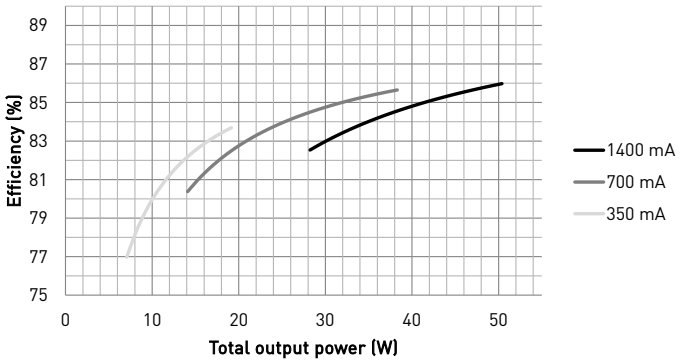


1) From 350 mA to 1400 mA, full dimming range (1 % - 100 %) available in the whole area.
2) From 100 mA to 350 mA, the absolute minimum dimming level is limited to 3.5 mA.

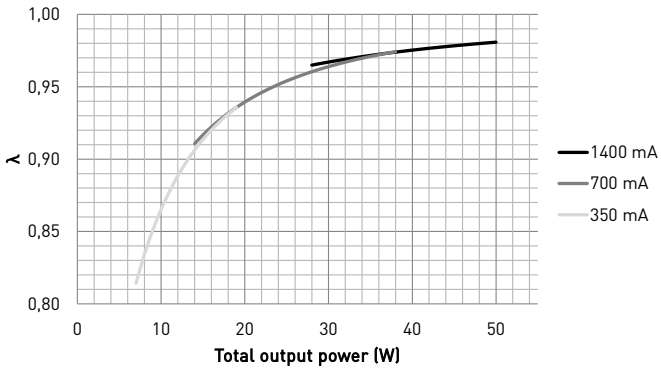
Current THD



Typical efficiency



Typical power factor



Operating Conditions and Characteristics

Absolute highest allowed t_c point temperature	85 °C
Tc life (50 000 h) temperature	85 °C
Ambient temperature range	–25 °C … +45 °C*
Storage temperature range	–40 °C … +80 °C
Maximum relative humidity	No condensation
Life time (90 % survival rate)	100 000 h, at t_c = 75 °C 70 000 h, at t_c = 80 °C 50 000 h, at t_c = 85 °C

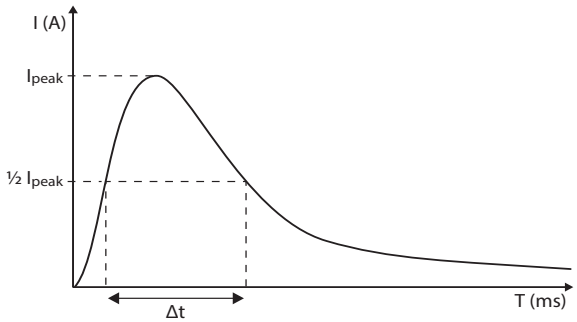
**) For other than independent use, higher t_a of the controlgear possible as long as highest allowed t_c point temperature is not exceeded*

Quantity of drivers per miniature circuit breaker 16 A Type C

Based on inrush current I_{peak}	Typ. peak inrush current I_{peak}	1/2 value time, Δt	Calculated energy, $I_{peak}^2 \Delta t$
60 pcs.	18 A	**180 µs**	**0.0412 A²s**

CONVERSION TABLE FOR OTHER TYPES OF MINIATURE CIRCUIT BREAKER

MCB type	Relative quantity of LED drivers
B 10 A	37 %
B 16 A	60 %
B 20 A	75 %
C 10 A	62 %
C 16 A	100 % (see table above)
C 20 A	125 %

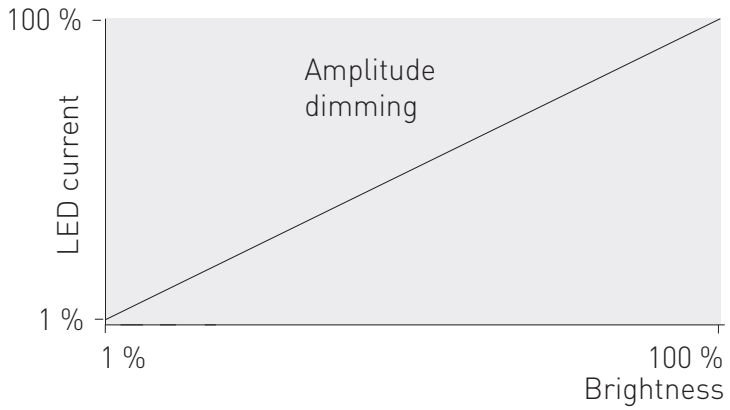


CONTINOUS CURRENT

Total continous current of the drivers and installation environment must always be considered and taken into calculations when installing drivers behind miniature circuit breaker. Example calculation of total drivers amount limited by continous current: n(I_{cont}) = (16 A ($I_{nom,Ta}$) / "nominal mains current with full load") x 0.76). This calculation is an example according to recommended precautions due to multiple adjacent circuit breakers (> 9 MCBs) and installation environment (T_a 30 degrees); variables may vary according to the use case. Both inrush current and continous current calculations are based on ABB S200 series circuit breakers. More specific information in ABB series S200 circuit breaker documentation.

NOTE! Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

Amplitude dimming technology

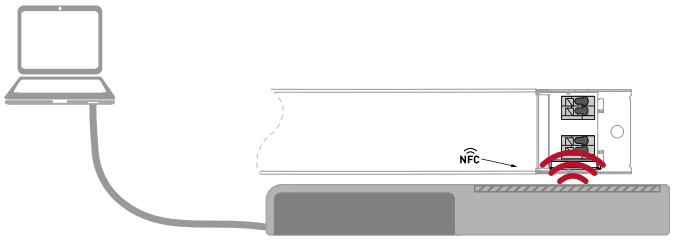


Dimming range	Dimming technology
1 % – 100 %	Amplitude (DC)

LL50SE-DA-100-1400-DS LED driver implements amplitude dimming technology across whole dimming range. Amplitude dimming offers the best available technology for dimming the light output in an accurate and flicker-free way to ensure high quality lighting in even the most demanding situations such as camera recording applications. Amplitude dimming technology complies with IEEE 1789-2015 recommendations of current modulation to mitigate health risks to viewers.

Wireless configuration

LL50SE-DA-100-1400-DS LED driver is equipped with NFC wireless technology for effortless configuration of the driver via Helvar Driver Configurator Support. Helvar Driver Configurator enables easy-to-use automatic configuration of the driver parameters via NFC, without mains or DALI connection to the driver. The most popular MD-SIG qualified NFC readers are supported giving flexibility for the operator. For further information about the usage with Helvar Driver Configurator, please see the user guide at www.helvar.com.

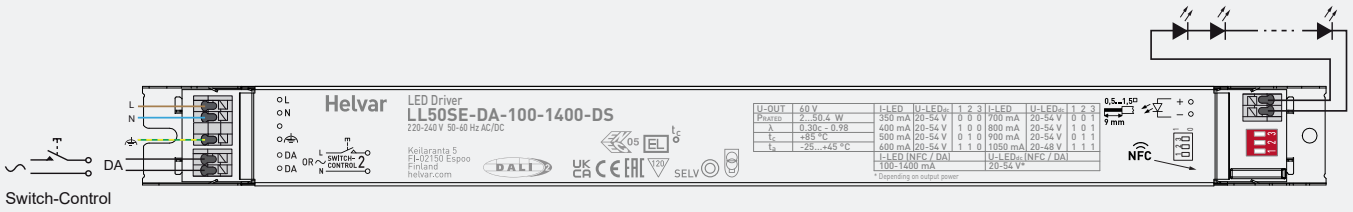


Feig NFC reader

Connections and Mechanical Data

Wire size	0.5 mm² – 1.5 mm²
Wire type	Solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	1.5 m
Weight	240 g
IP rating	IP20

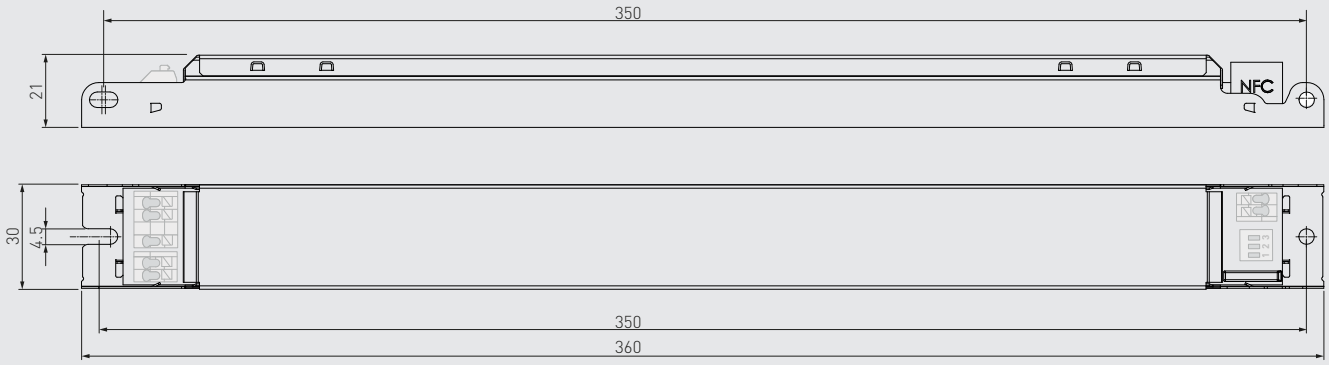
Connections



Note:

- *Earth connection to PE terminal is optional and not needed for the functionality of the driver. See page 5 for details.*
- *Not suitable for load side switching operation*

Dimensions (mm)



In LL50SE-DA-100-1400-DS the current can be set with DIP switches. With each combination of switch setup, a different output current value can be set. The maximum value can be reached with the DIP switch setting "111" (DIP switches pushed towards label, see connections picture above) and minimum with all switches set to "0". The default output current values according to the DIP switch settings are presented below.
With Smart Switch technology, it is possible to adjust the output currents of different combinations with software programming. Please refer to the Helvar Driver Configurator software and instructions for further guidance.

Note: The DIP switch is always the default method for setting the output current. If the current is programmed and fixed with Helvar Driver Configurator however, the DIP switch will be ignored.

DIP switch combinations, output currents and voltage ranges (Nominal I_{out} (±5 % tol.))

DIP switch combination	000	100	010	110	001	101	011	111
I_{out} (mA)	350	400	500	600	700	800	900	1050
Voltage range	20 – 54 V	20 – 54 V	20 – 54 V	20 – 54 V	20 – 54 V	20 – 54 V	20 – 54 V	20 – 48 V

LL50SE-DA-100-1400-DS LED driver is suited for built-in usage in luminaires. In order to have safe and reliable LED driver operation, the LED luminaires will need to comply with the relevant standards and regulations (e.g. IEC/EN 60598-1). The LED luminaire shall be designed to adequately protect the LED driver from dust, moisture and pollution. The luminaire manufacturer is responsible for the correct choice and installation of the LED drivers according to the application and product datasheets. Operating conditions of the LED drivers may never exceed the specifications as per the product datasheet.

Installation & operation

Maximum ambient and t_c temperature:

- For built-in components inside luminaires, the t_a ambient temperature range is a guideline given for the optimum operating environment. However, integrator must always ensure proper thermal management (i.e. mounting base of the driver, air flow etc.) so that the t_c point temperature does not exceed the t_c maximum limit in any circumstance.
- Reliable operation and lifetime is only guaranteed if the maximum t_c point temperature is not exceeded under the conditions of use.

Current setting

LL50SE-DA-100-1400-DS LED driver features a constant current output adjustable with the DIP switch or through NFC/DALI programming. See page 4 for the table of the default DIP switch combinations. With Smart Switch technology, it is possible to adjust these output currents for different combinations.

LED driver earthing

- LL50SE-DA-100-1400-DS is LED driver suitable for Class I and II luminaires. When used inside **Class I and Class II** luminaires, the earth cable is recommended to be connected to improve the EMC performance of the driver, but it is not mandatory. It is the responsibility of the integrator to ensure that the assembled luminaire EMC performance complies with the latest standards.

Miniature Circuit Breakers (MCB)

- Type-C MCB's with trip characteristics in according to EN 60898 are recommended.
- Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

Helvar Driver Configurator -support

LL50SE-DA-100-1400-DS LED driver is supported by Helvar Driver Configurator software. With the LL50SE-DA-100-1400-DS the output current of the driver can be programmed using the HDC software, as well as OEM customer data and parameters for features such as CLO and Smart Switch. Programming the driver with Helvar Driver Configurator can be done either wirelessly via NFC or then via DALI bus.

Lamp failure functionality

No load

When open load is detected, driver will go to standby power consumption and remains in automatic recovery mode. In automatic recovery mode, the driver waits till load is returned and once that happens, it returns to normal operation.

Short circuit

When short circuit is detected, driver goes to automatic recovery mode and follows the same logic as described in the no load condition.

Overload

When overload is detected, driver goes to standby mode and returns through mains reset.

Underload

When undervoltage is detected, driver goes to standby mode and returns through mains reset.

Switch-Control 2

Before installation and for troubleshoot and guidance, refer to Switch-Control User Guide at www.helvar.com.

Use of Switch-Control functionality

- Maximum numbers of LED drivers to be connected to one switch is 60. Wire length is not restricted by the driver technology.
- Power on to last level mode is enabled by default, ensuring that the driver returns to the last memorized light level before mains interruption in cases of e.g. power outages.
- Ensure that all components connected to Switch-Control circuitry are mains rated.
- The X2 rated (1 µF) capacitor has to be installed between control lines incase of unwanted behavior of lights. See details and guidance from the User guide.

Conformity & standards

General and safety requirements	EN 61347-1
Particular safety requirements for DC or AC supplied electronic control gear for LED modules	EN 61347-2-13
Additional safety requirements for AC or DC supplied electronic controlgear for emergency lighting	EN 61347-2-13, Annex J
Thermal protection class	EN 61347, C5e
Mains current harmonics	EN 61000-3-2
Limits for voltage fluctuations and flicker	EN 61000-3-3
Radio frequency interference	EN 55015
Immunity standard	EN 61547
Performance requirements	EN 62384
Digital addressing lighting interface:	
General requirements for DALI system	EN 62386-101 (DALI-2)
Requirements for DALI control gear	EN 62386-102 (DALI-2)
Requirements for control gear of LED modules (DALI Device Type 6)	EN 62386-207 (DALI-2)
Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers	IEEE 1789-2015
Compliant with relevant EU directives	
RoHS/REACH compliant	
ENEC and CE / UKCA marked	

Label symbols

Safety isolating control gear with short circuit protection (SELV control gear).

Double insulated control gear suitable for built-in use.

Thermally controlled control gear, incorporating means of protection against overheating to prevent the case temperature under any conditions of use from exceeding 120 °C.

DALI-2 certified control gear.

Driver equipped with NFC wireless technology for effortless configuration.

AC/DC supplied electronic control gear for emergency lighting purposes intended for connection to a centralized emergency power supply.